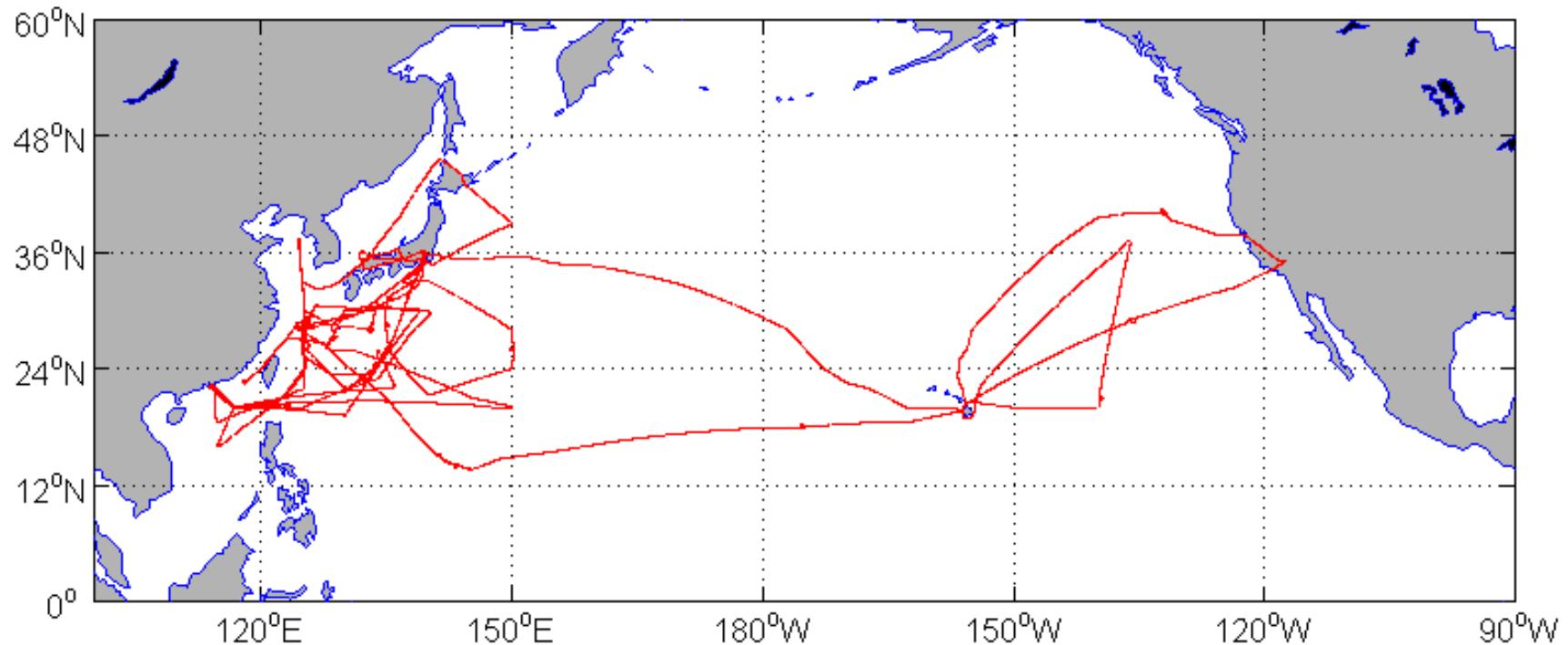


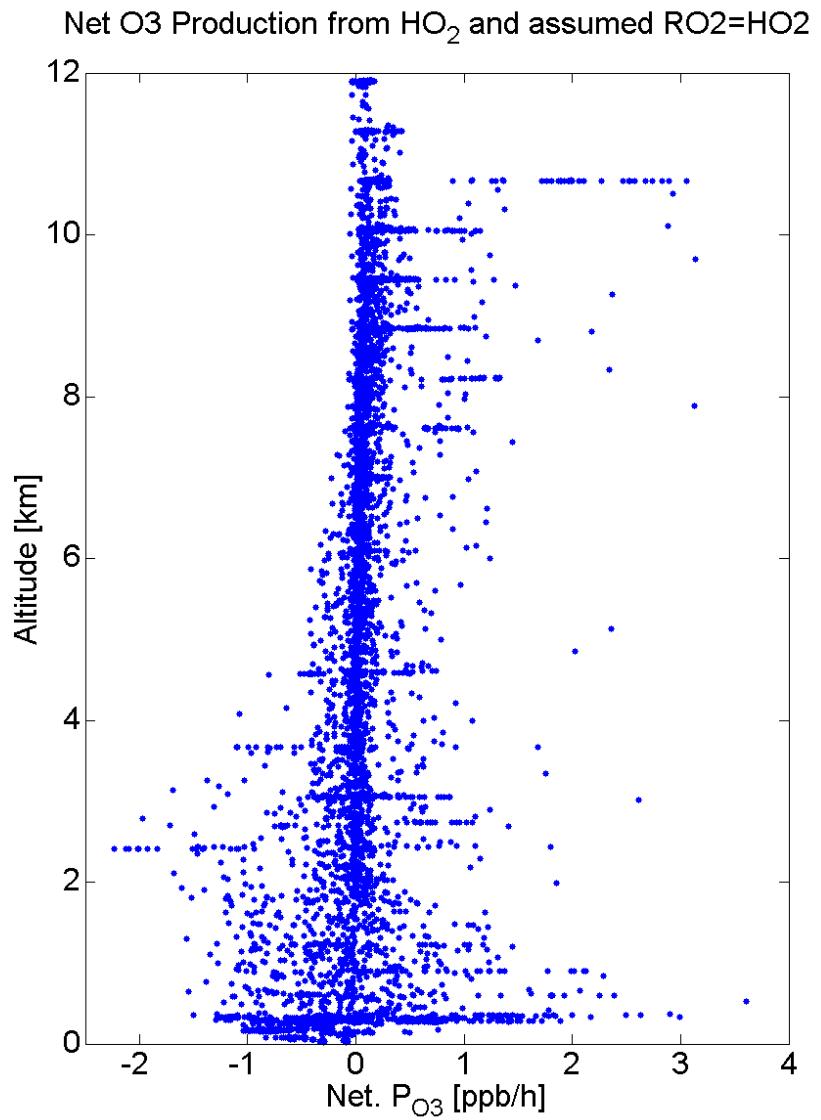
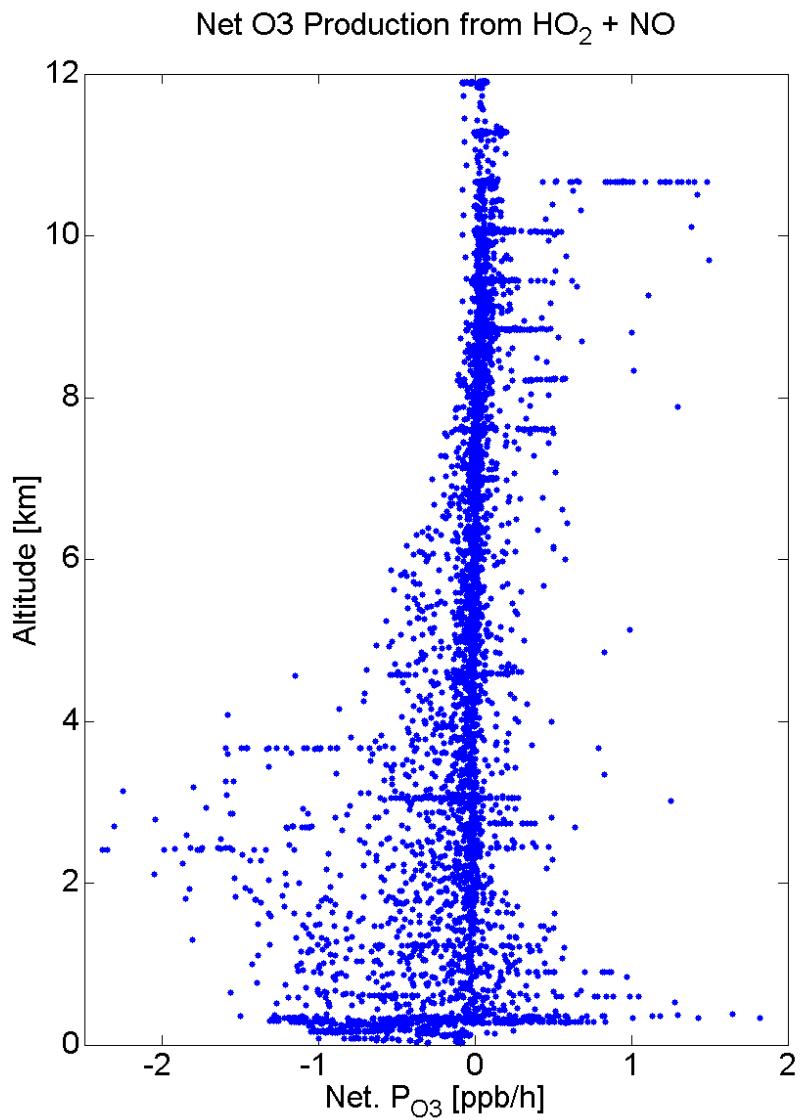
HO_x measurements during the NASA TRACE-P mission

H. Harder, M. Martinez and W. Brune

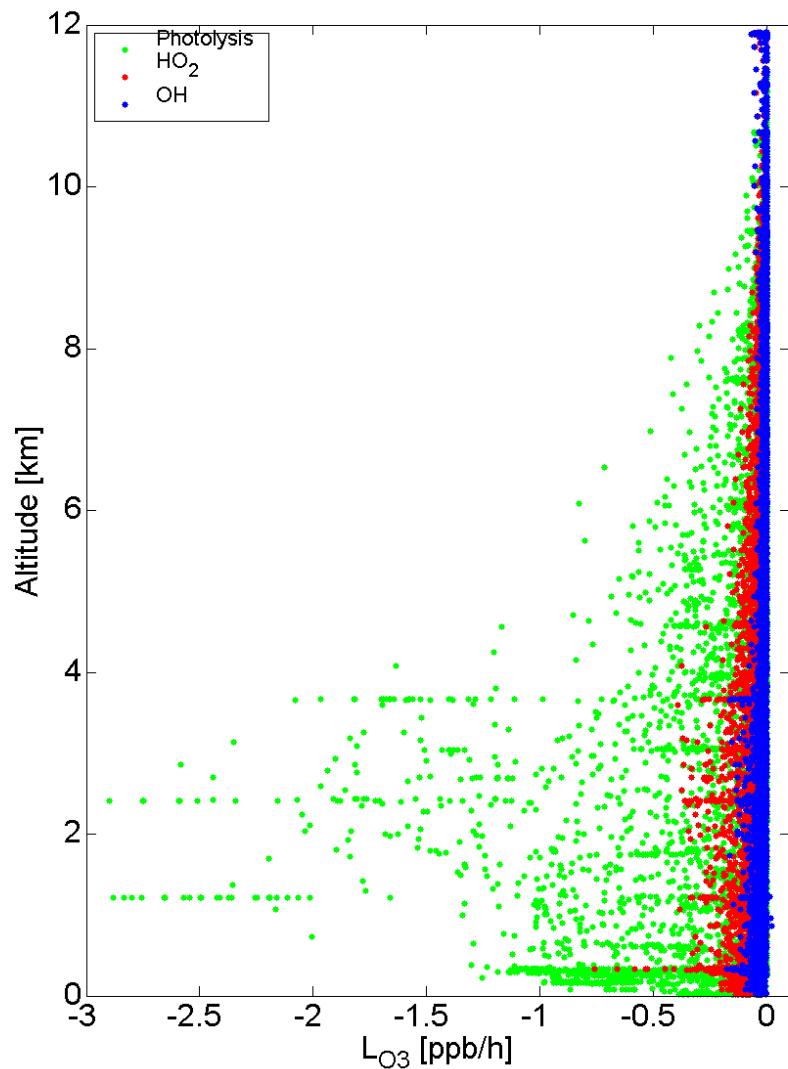


O₃ Budget

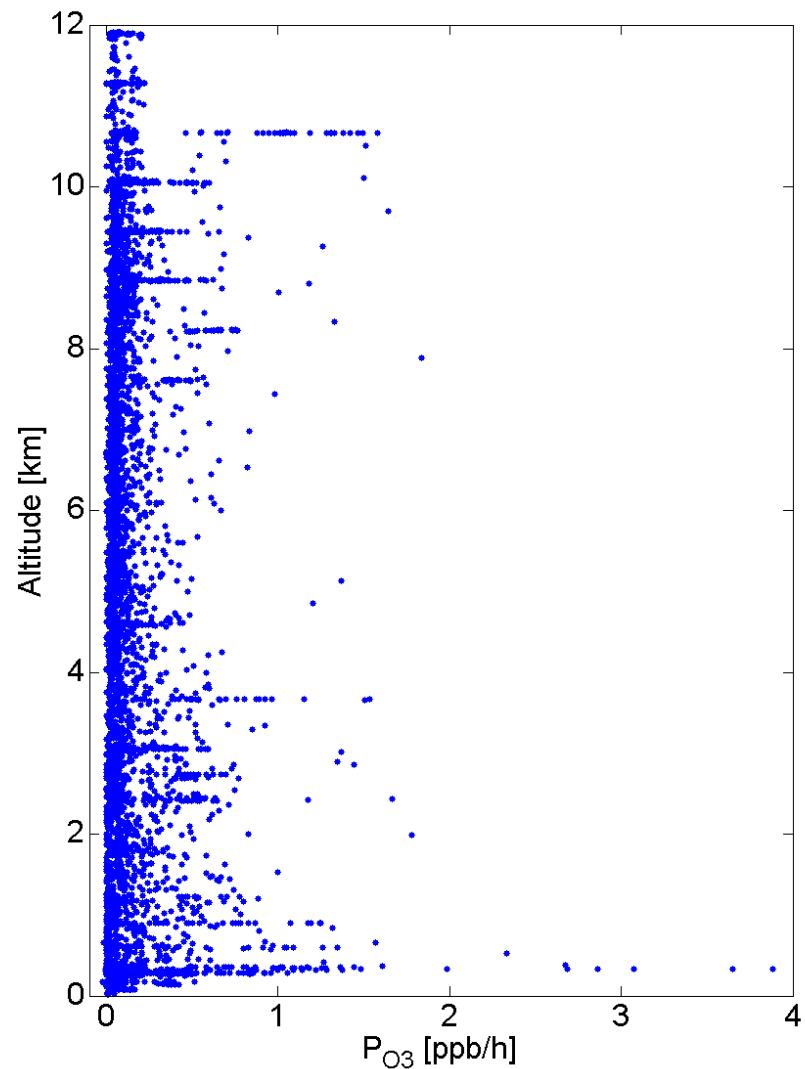
- Characterize conditions for O₃ production and loss and the relation ship to HOx
- Use transport and box model to test understanding of O₃ formation and chemical evolution of photo chemistry along trajectories which were probed multiple times by the DC8.

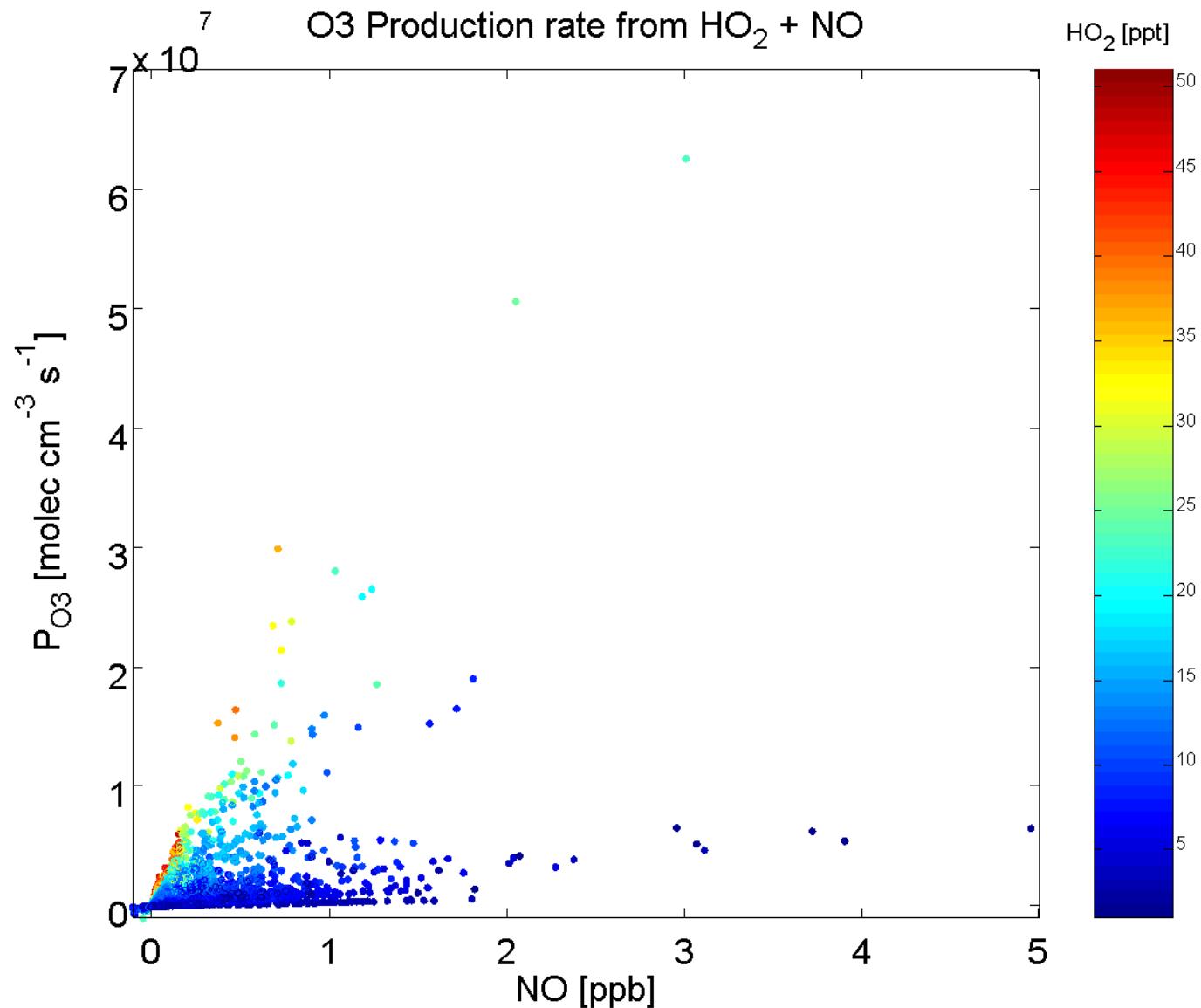


O_3 loss from OH, HO_2 and Photolysis

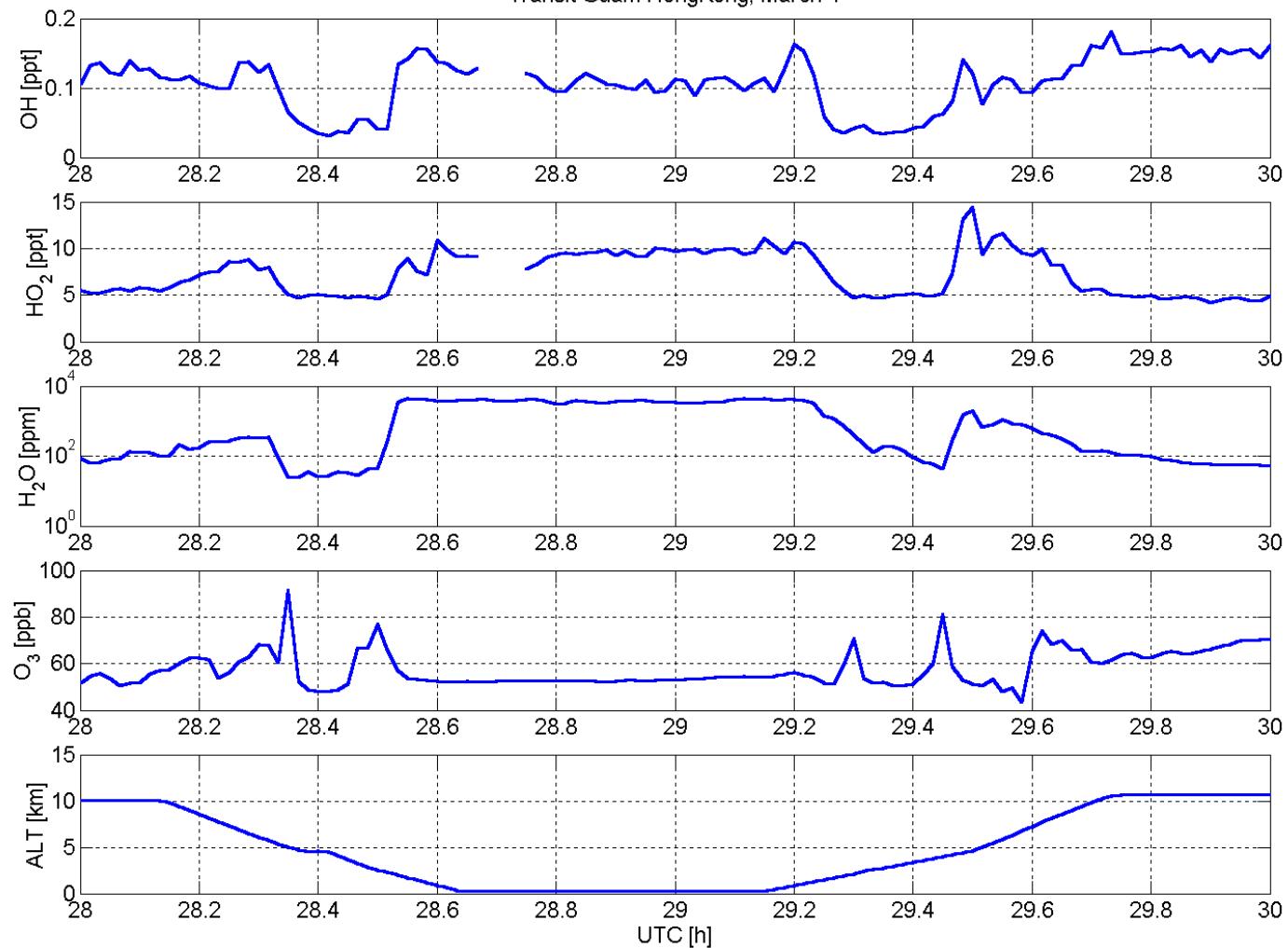


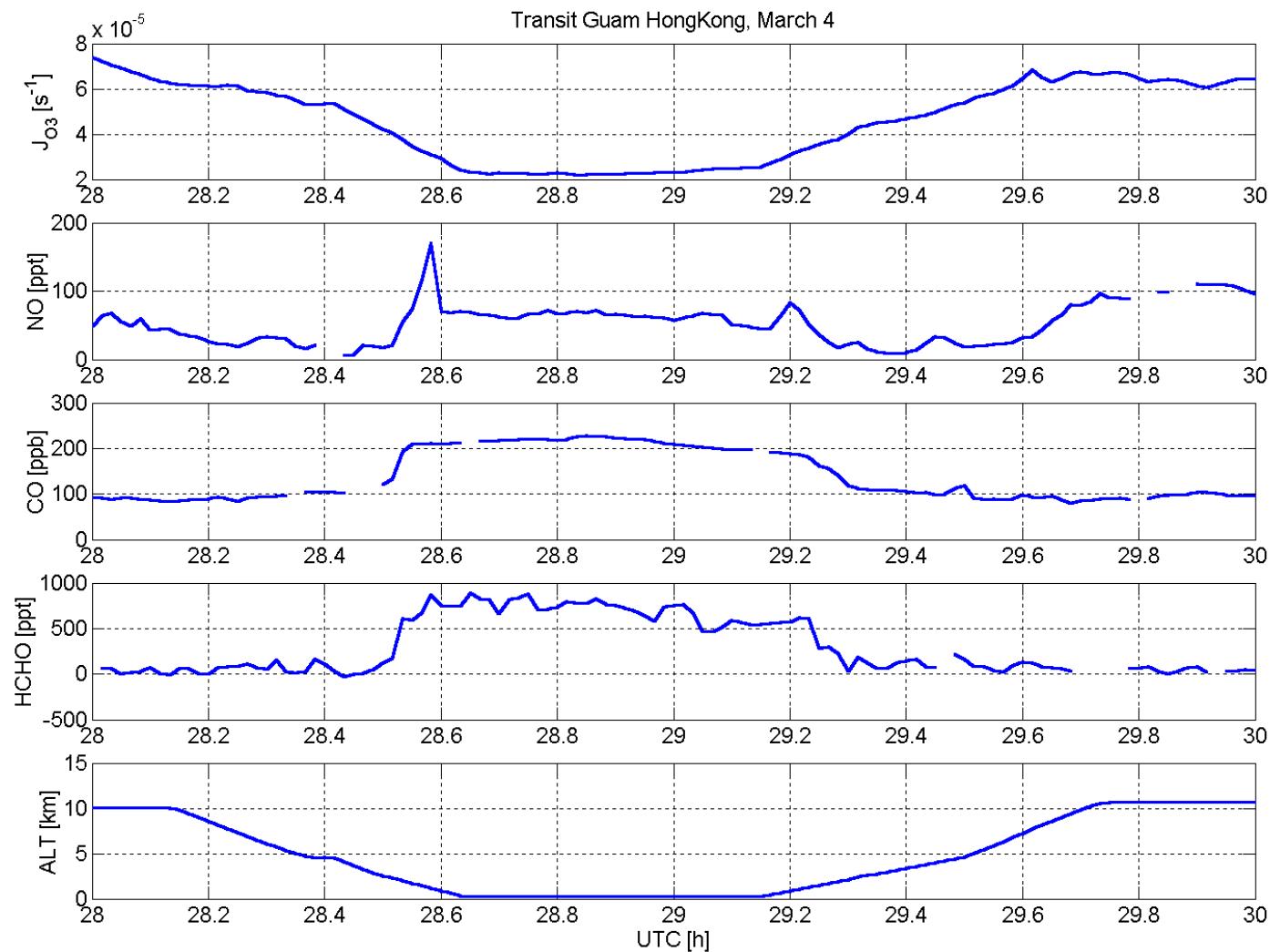
O_3 Production from $HO_2 + NO$





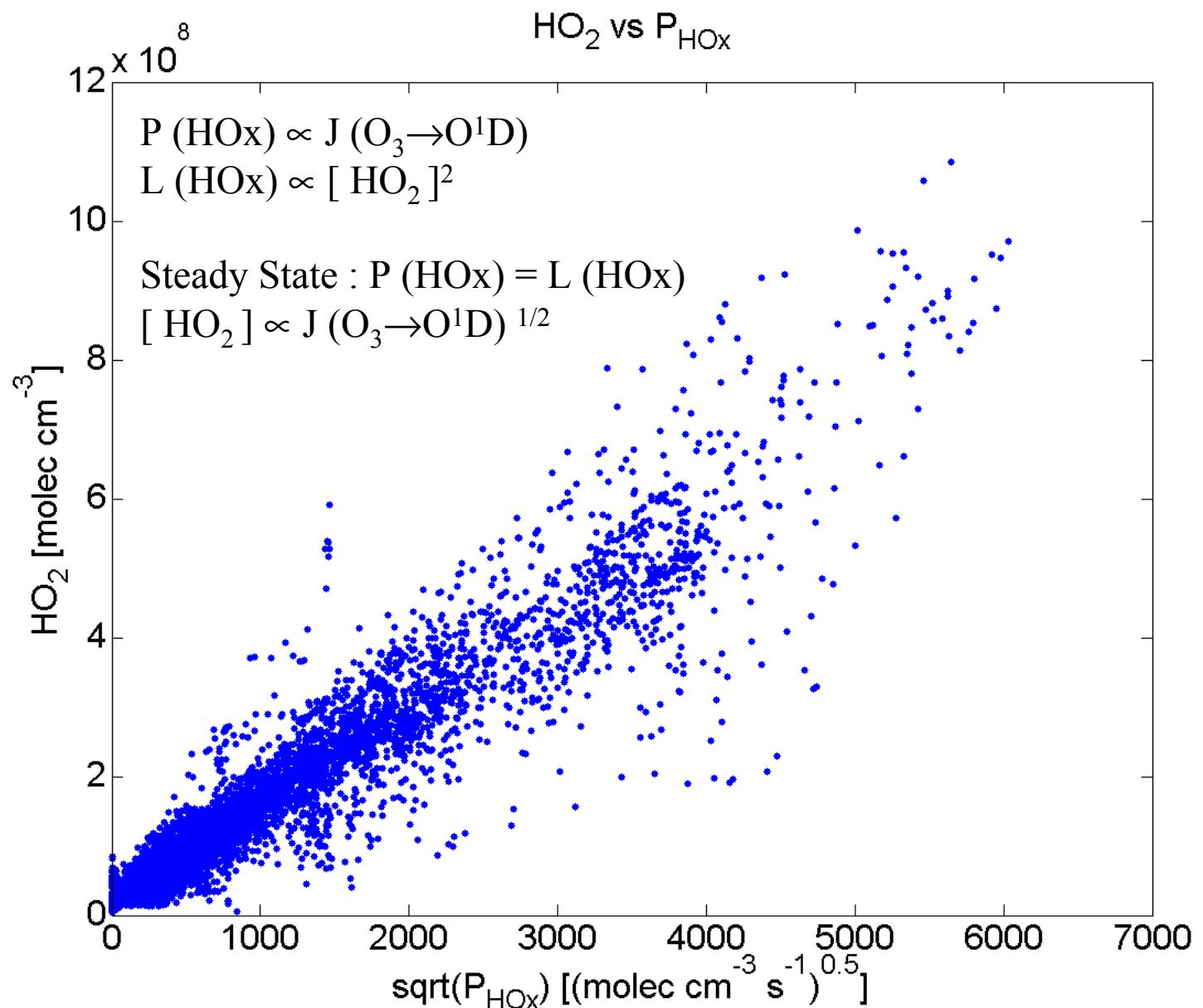
Transit Guam HongKong, March 4

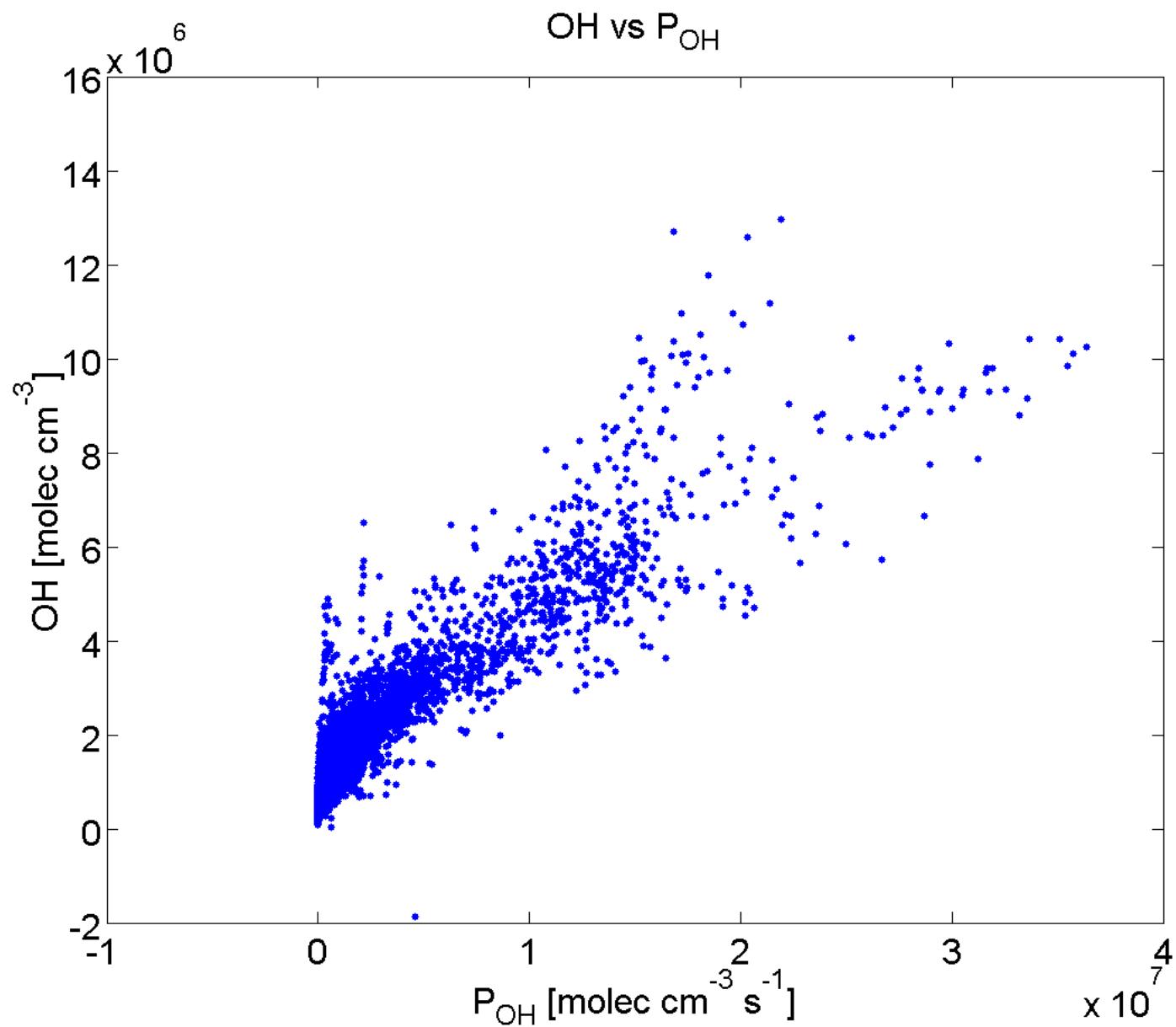


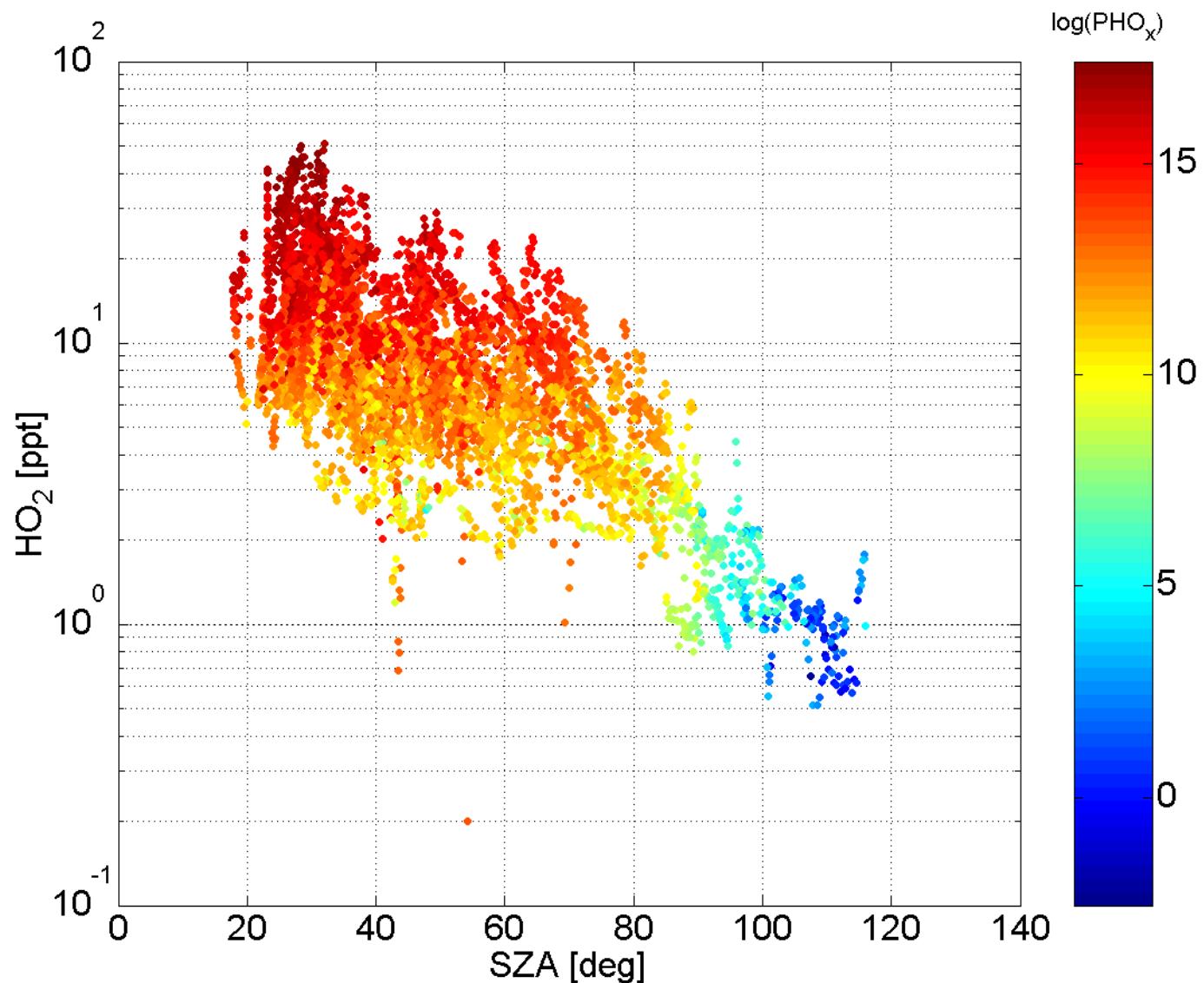


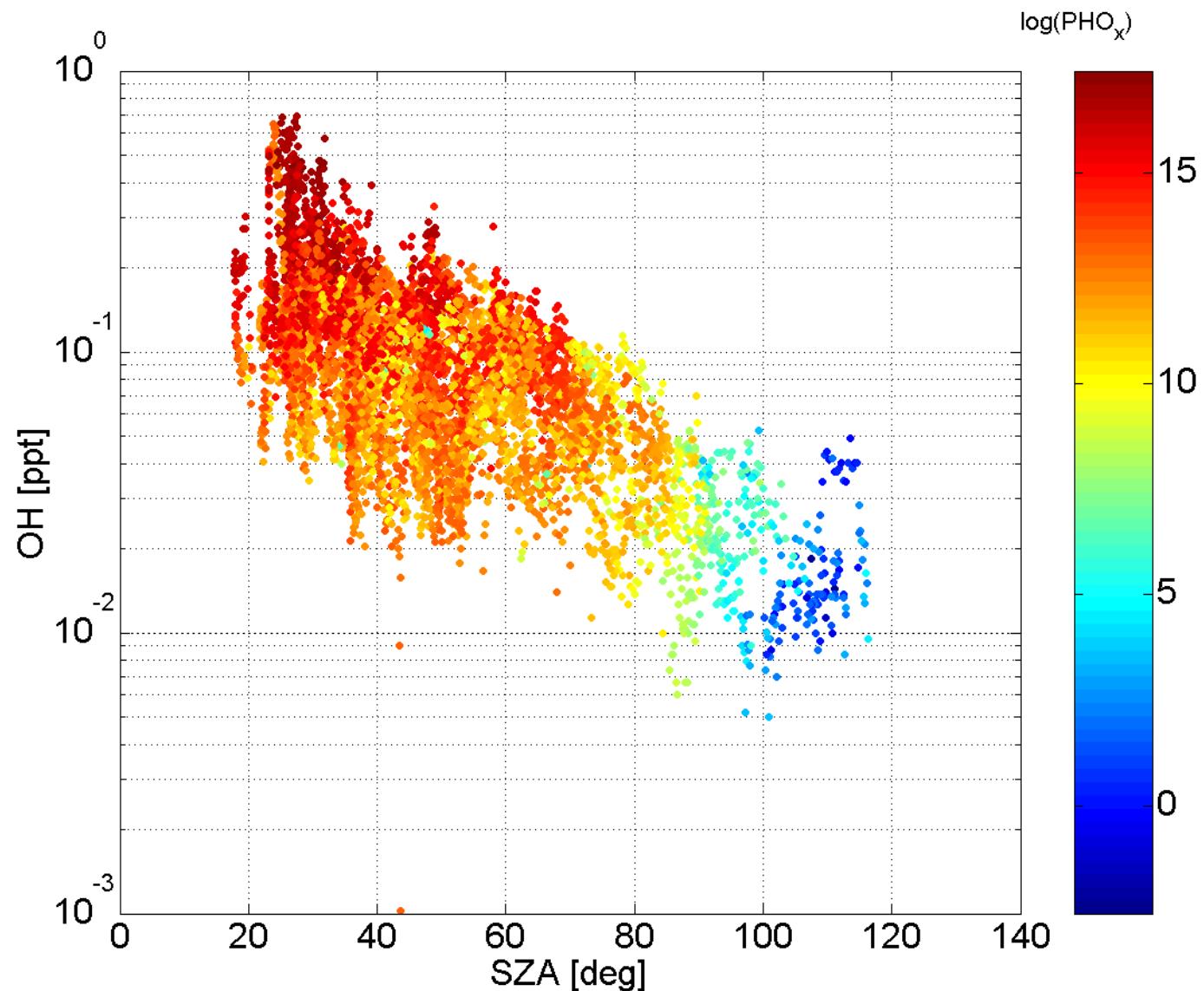
General behaviour of HOx

- Understanding HOx sources and sinks
- Parameterization of HOx
- Try to identify possible mechanisms for night time HOx or identify source of instrument interference
- Comparison with model results

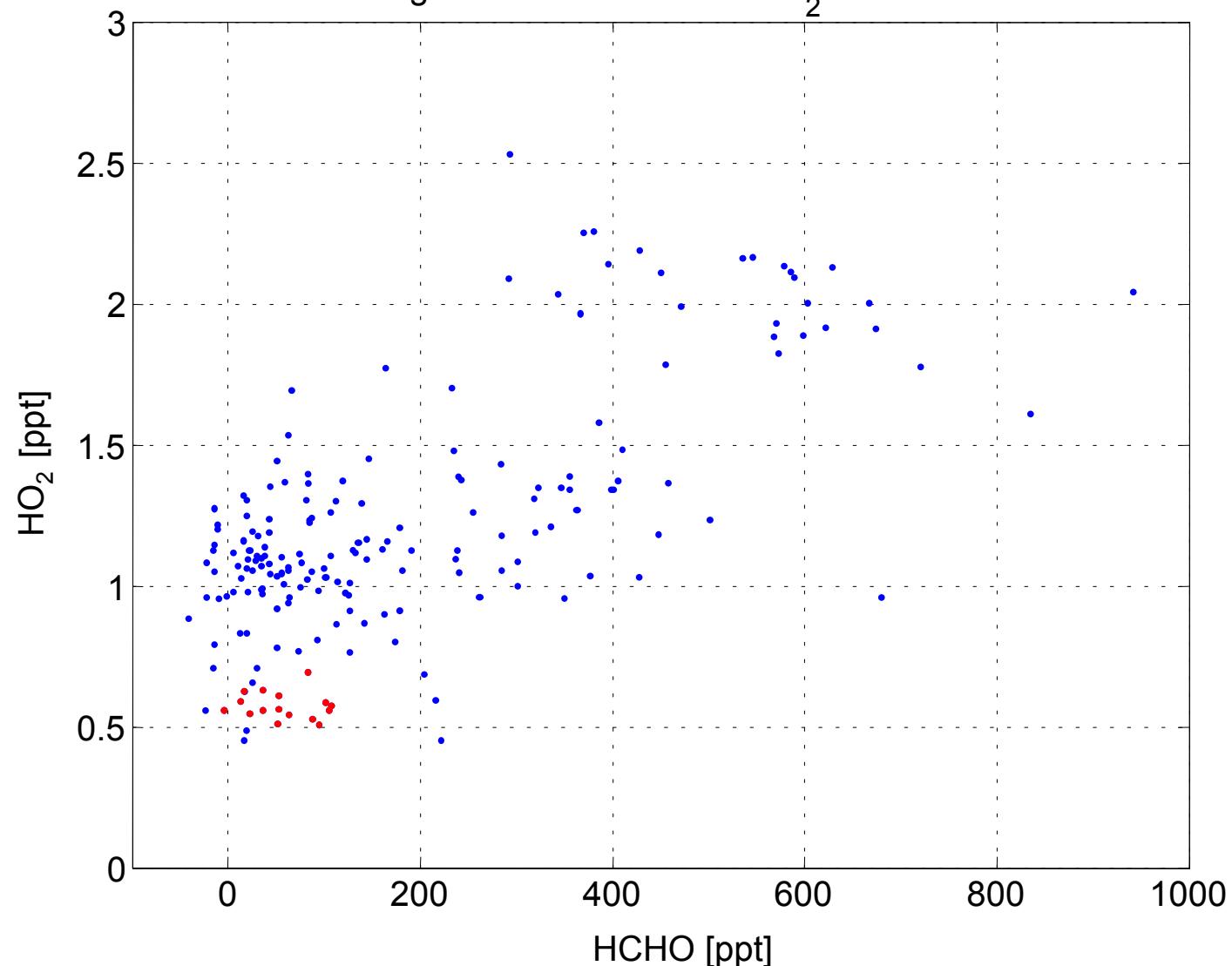




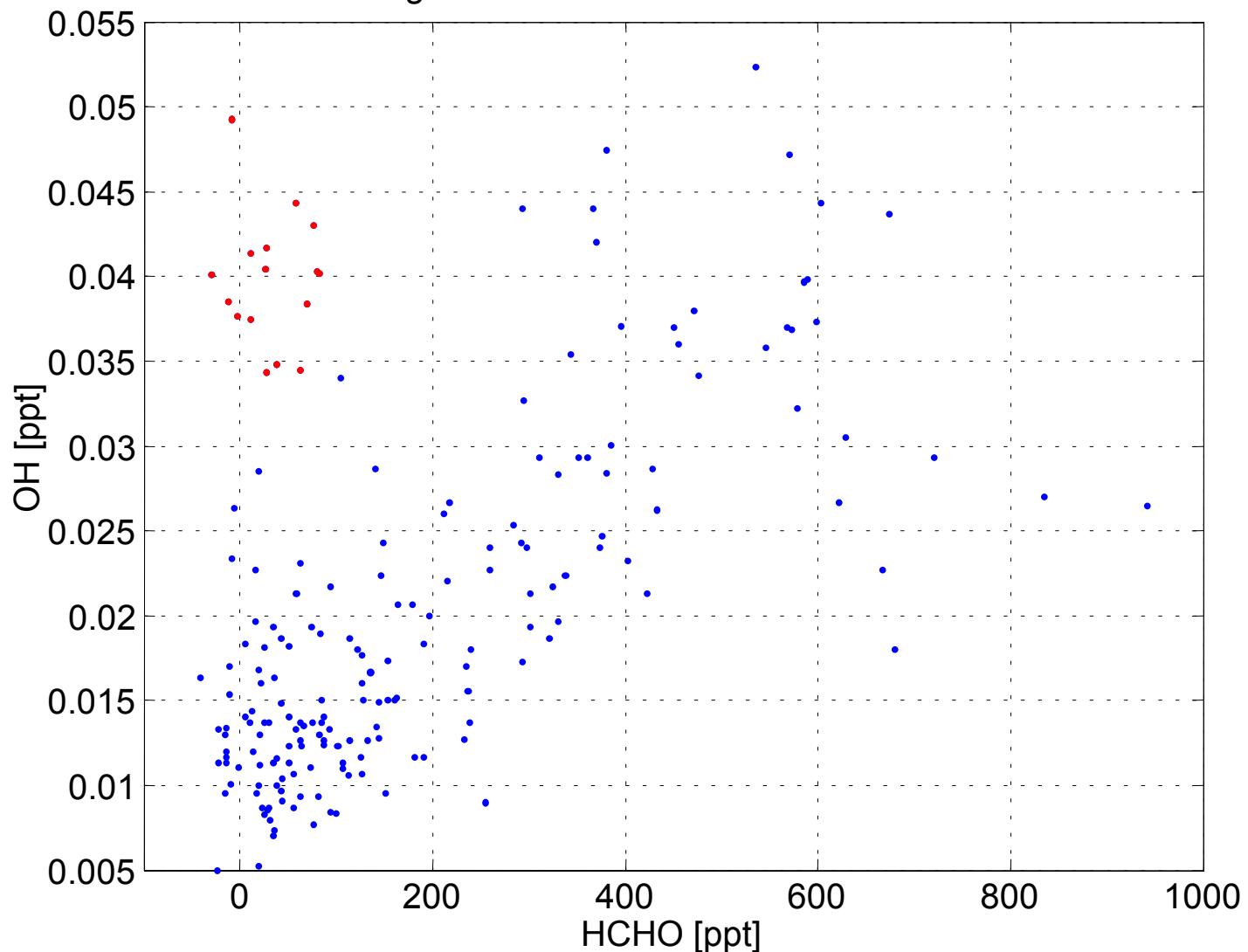




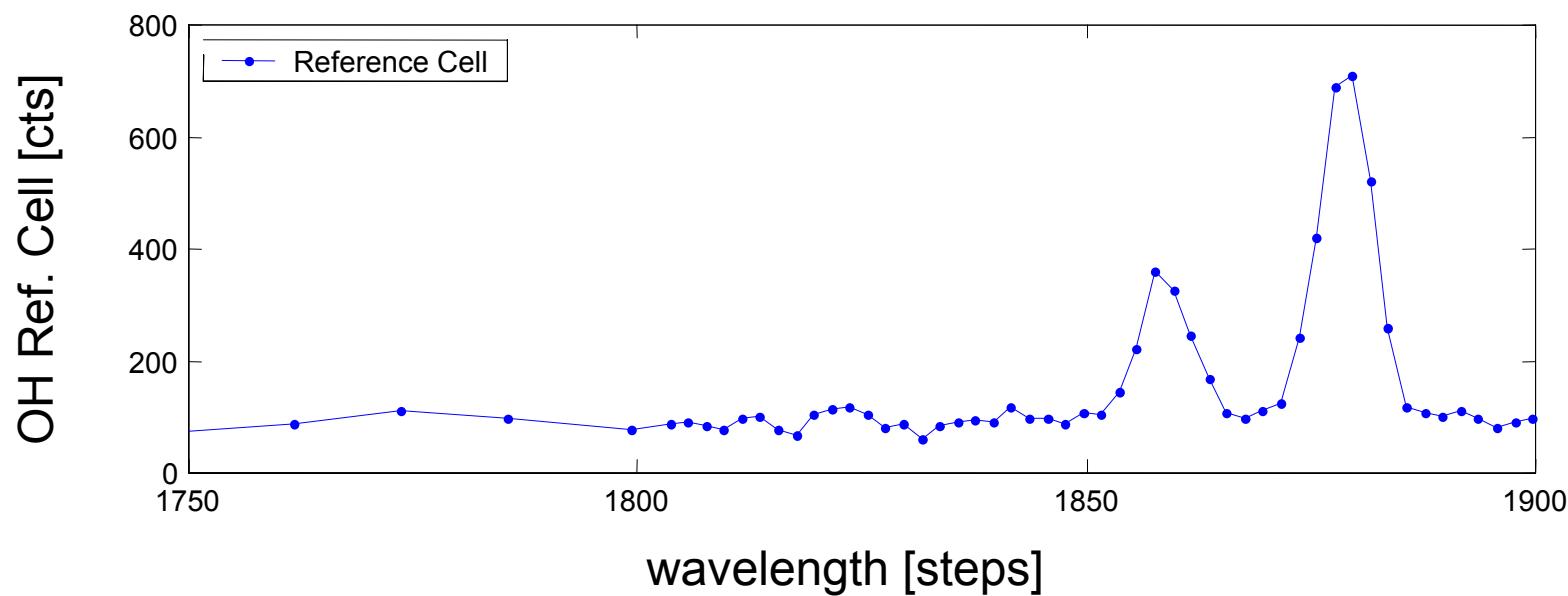
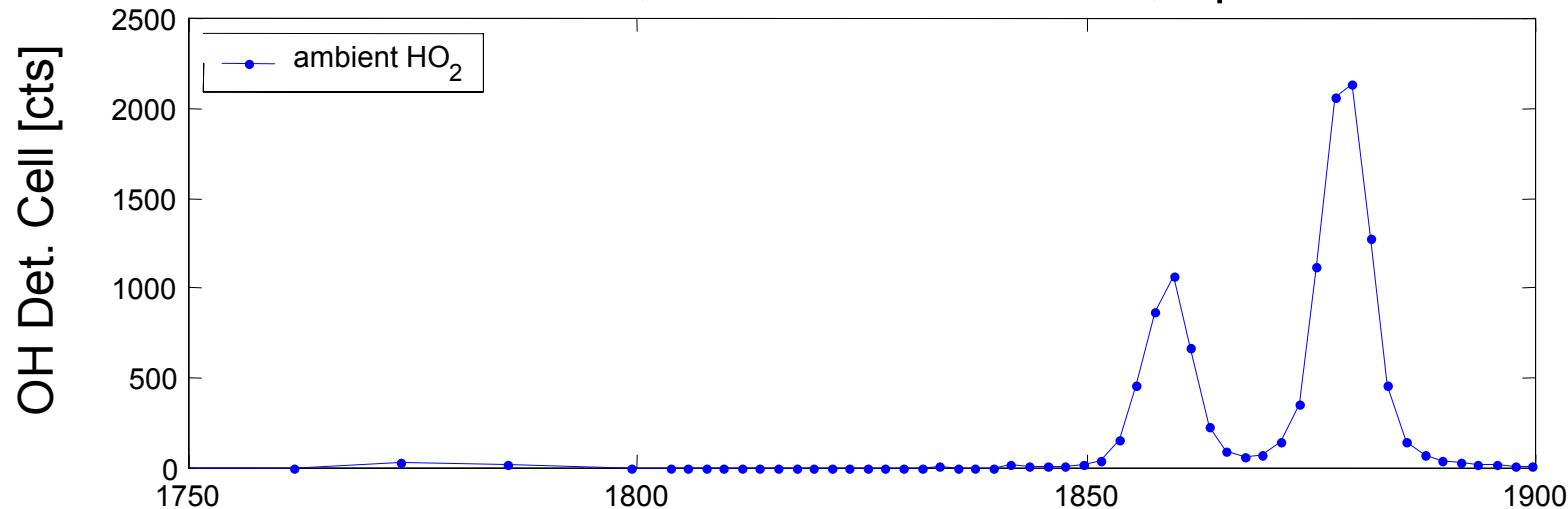
Night time correlation of HO_2 vs HCHO



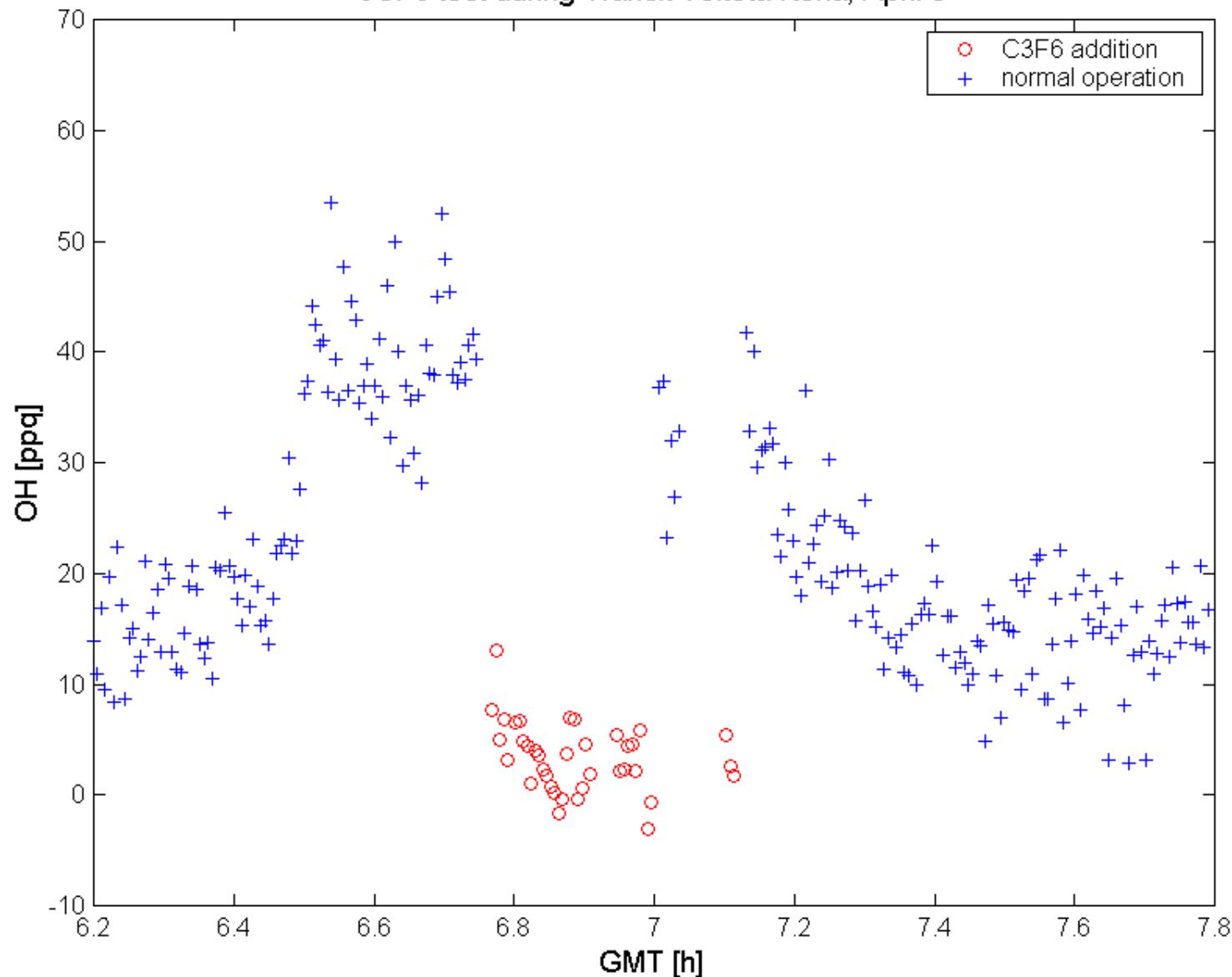
Night time correlation of OH vs HCHO



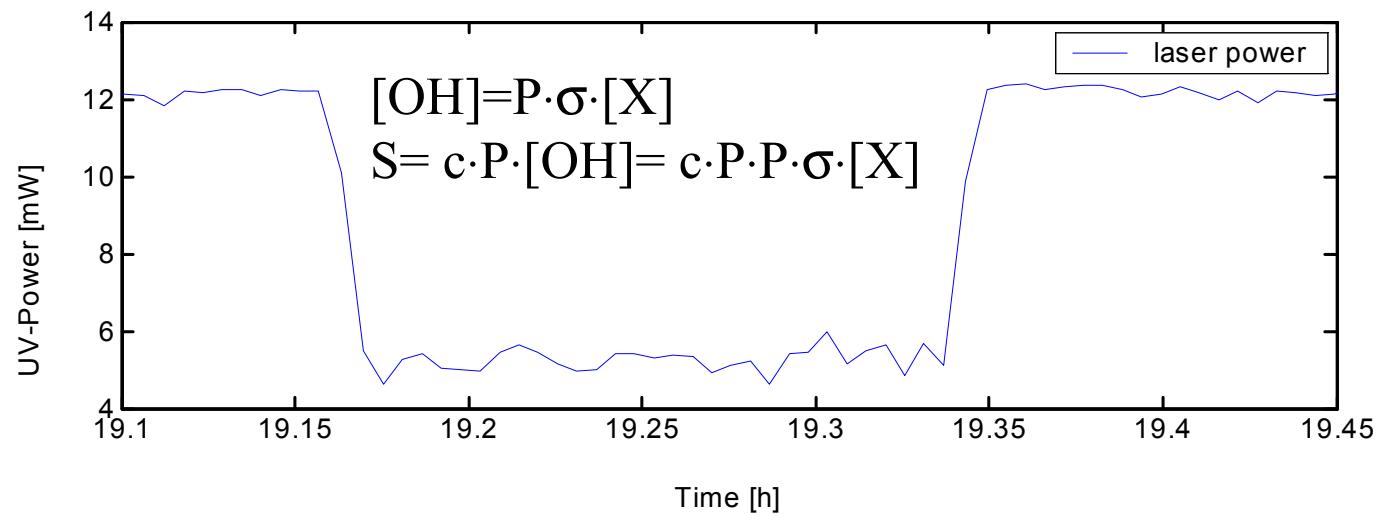
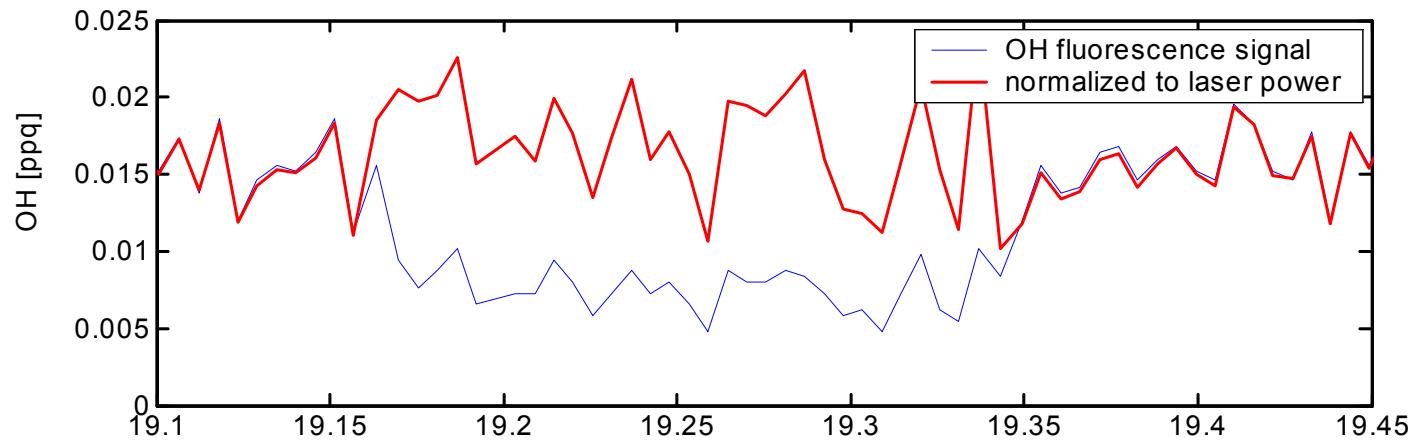
Laser Scan, Transit Yokota Kona, April 3



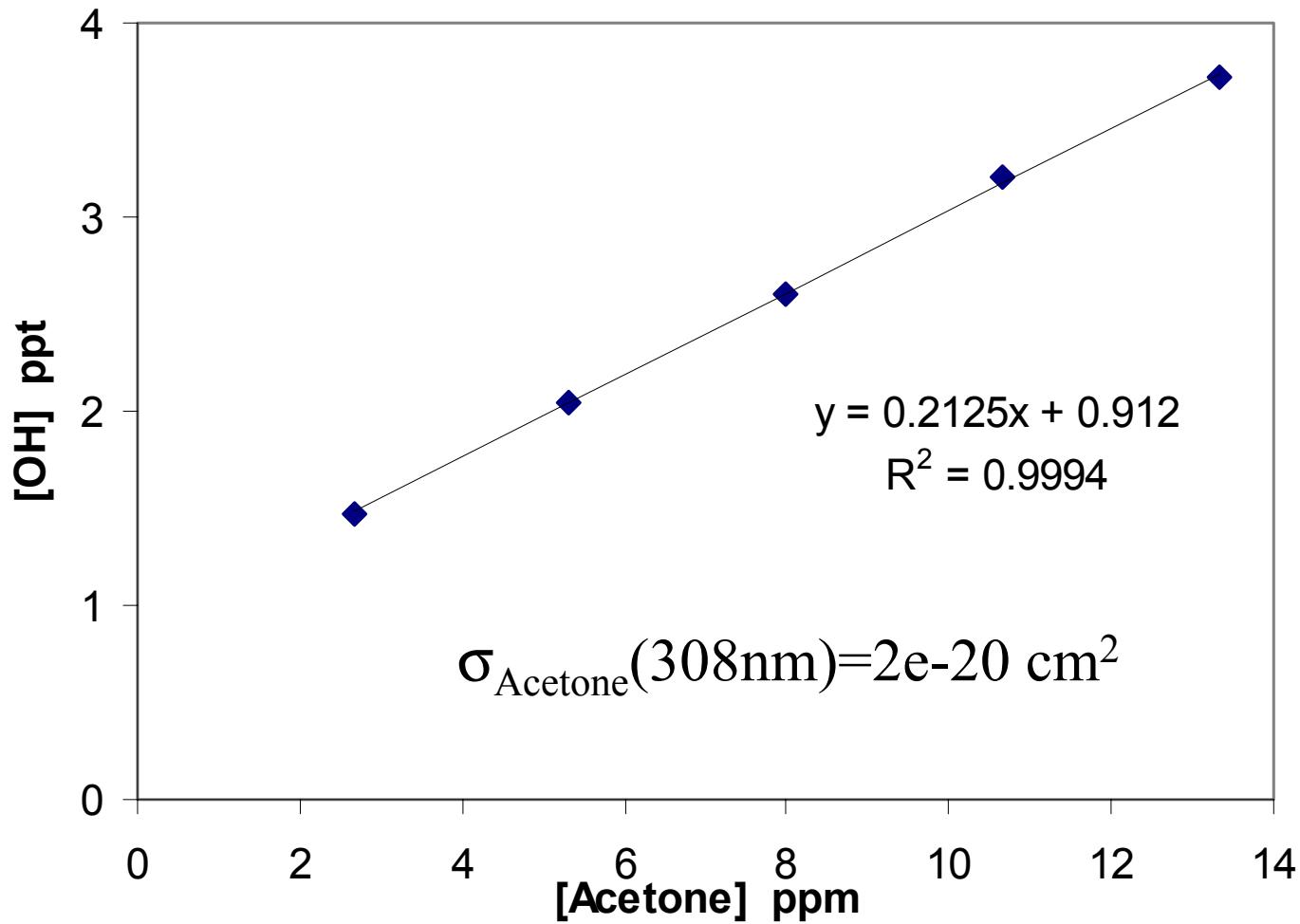
C3F6 test during Transit Yokota Kona, April 3



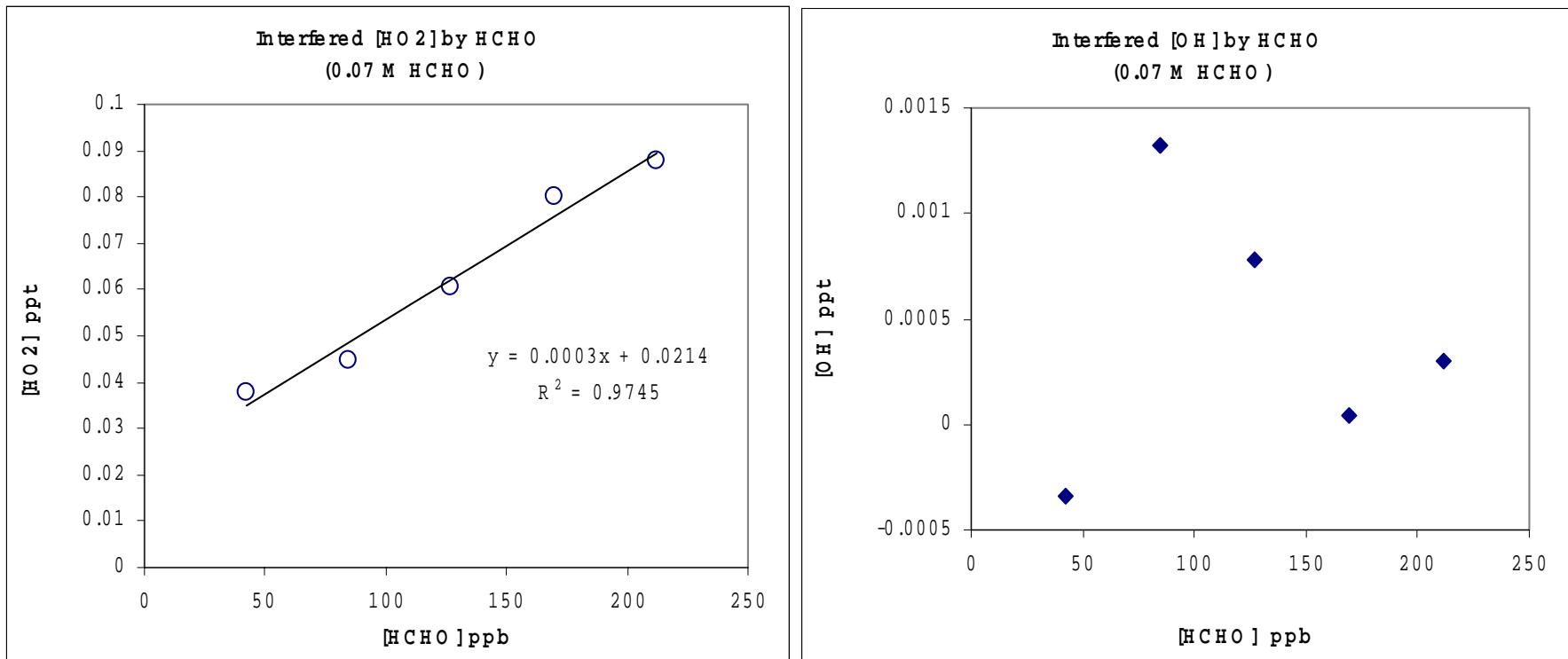
Laser Power Test



Acetone Interference to OH



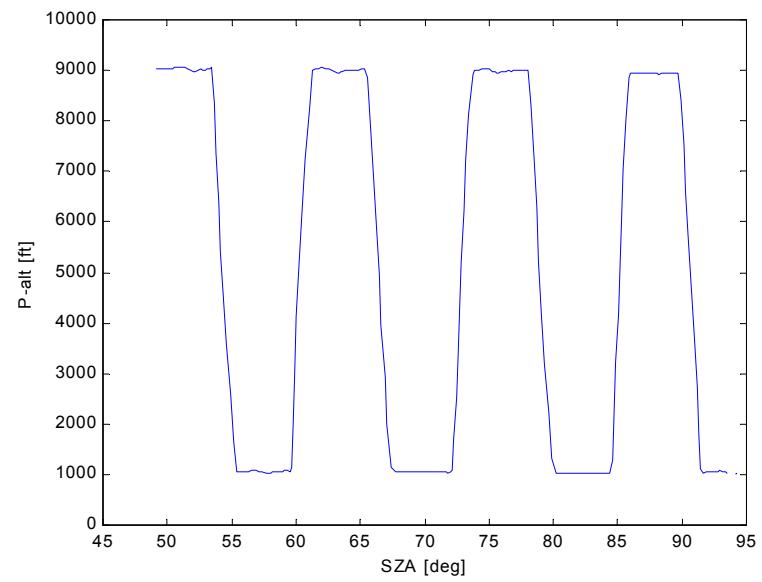
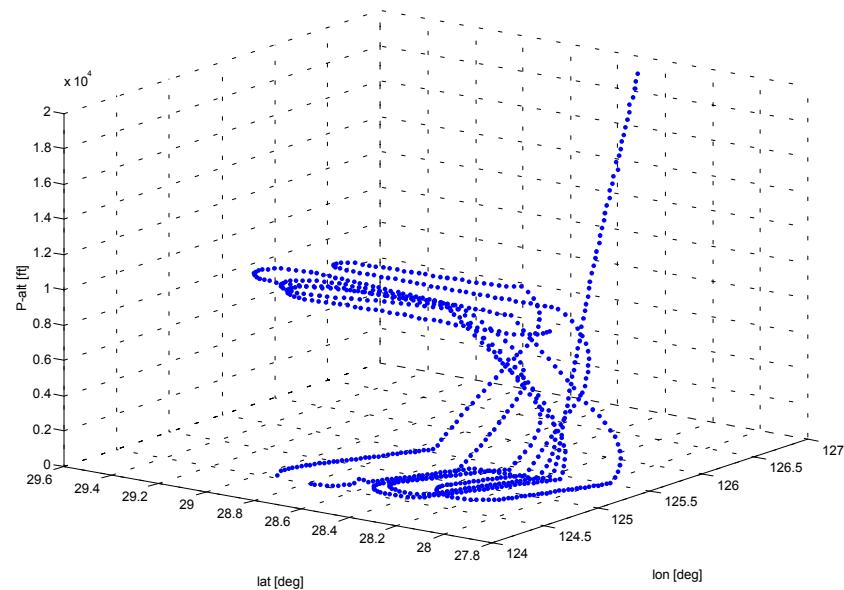
HO_2 - Interference



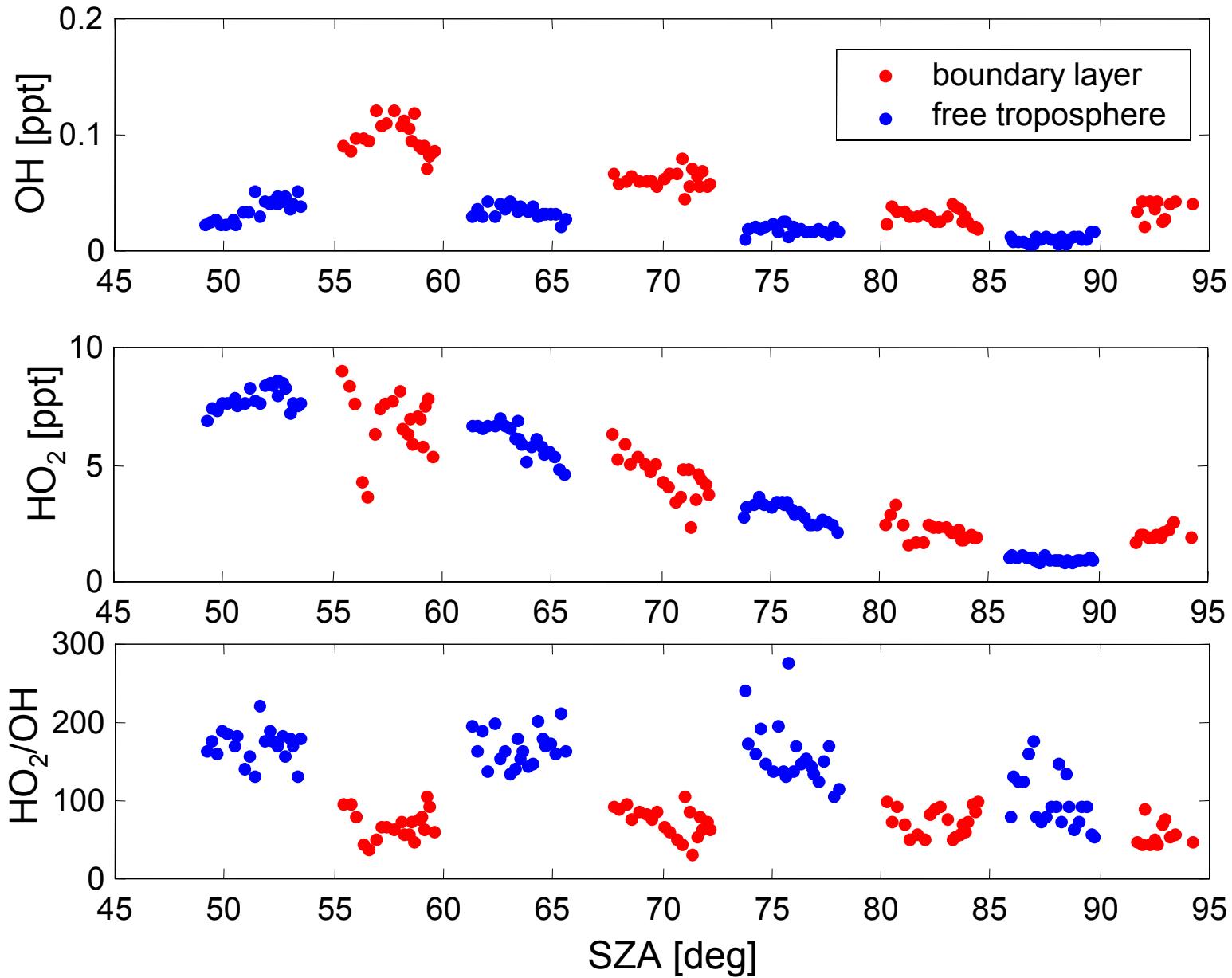
HO_x formation and loss during sunrise and sunset

- Verify understanding of HO_x sources and sinks under sunrise and sunset conditions in polluted and clean air masses

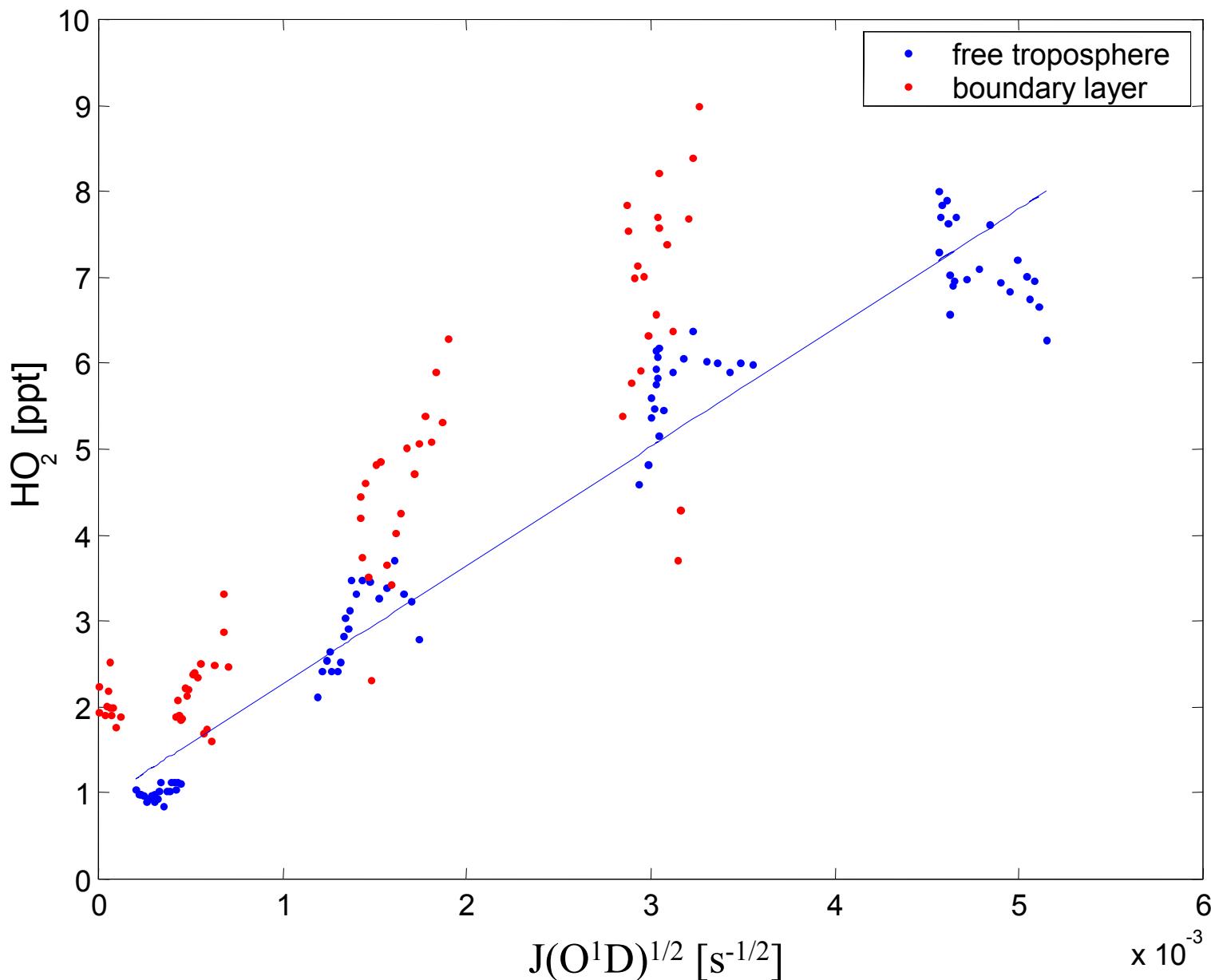
Flight track / Sunrise, March 29



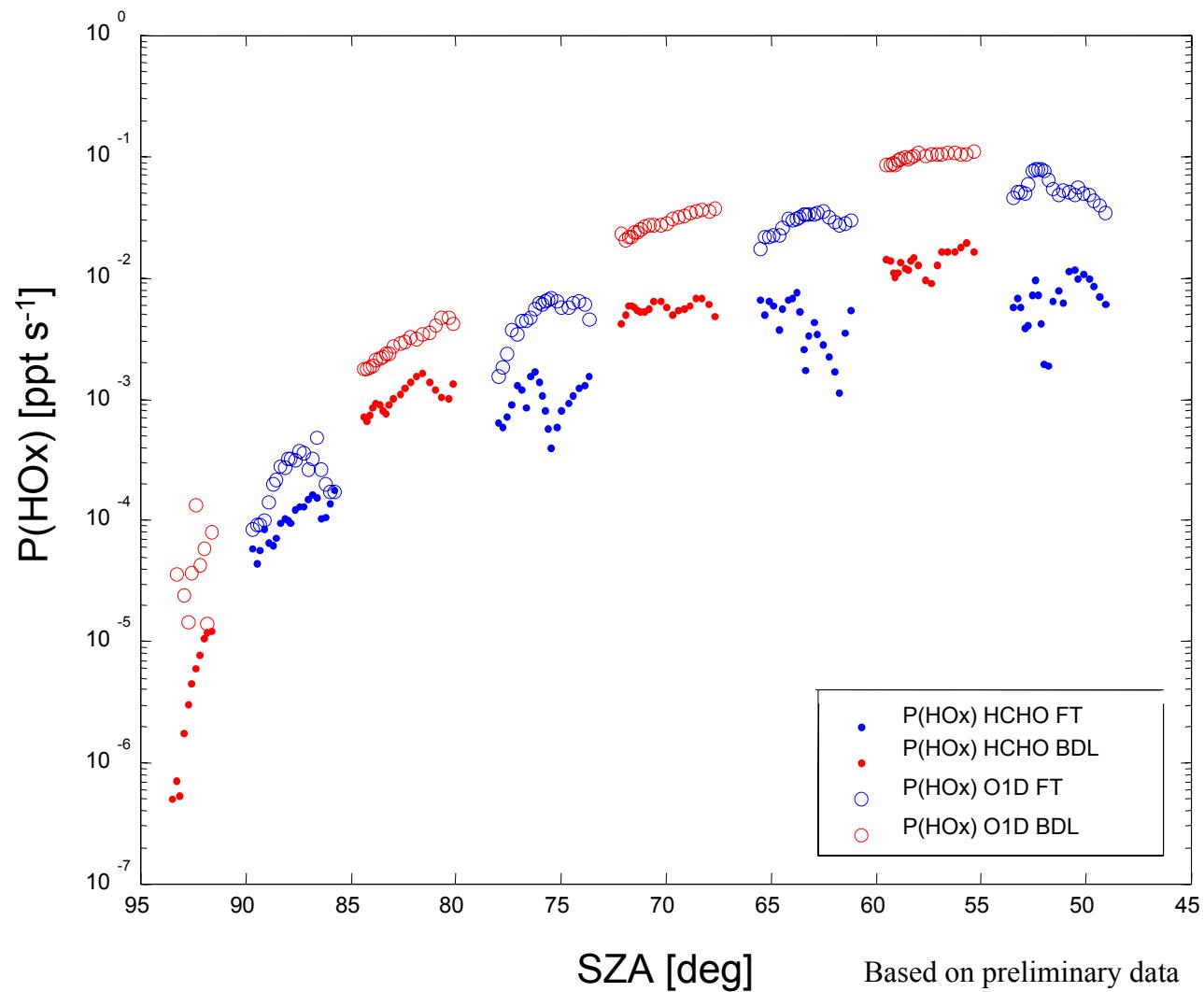
Sunrise, March 29, Yokota Local 4



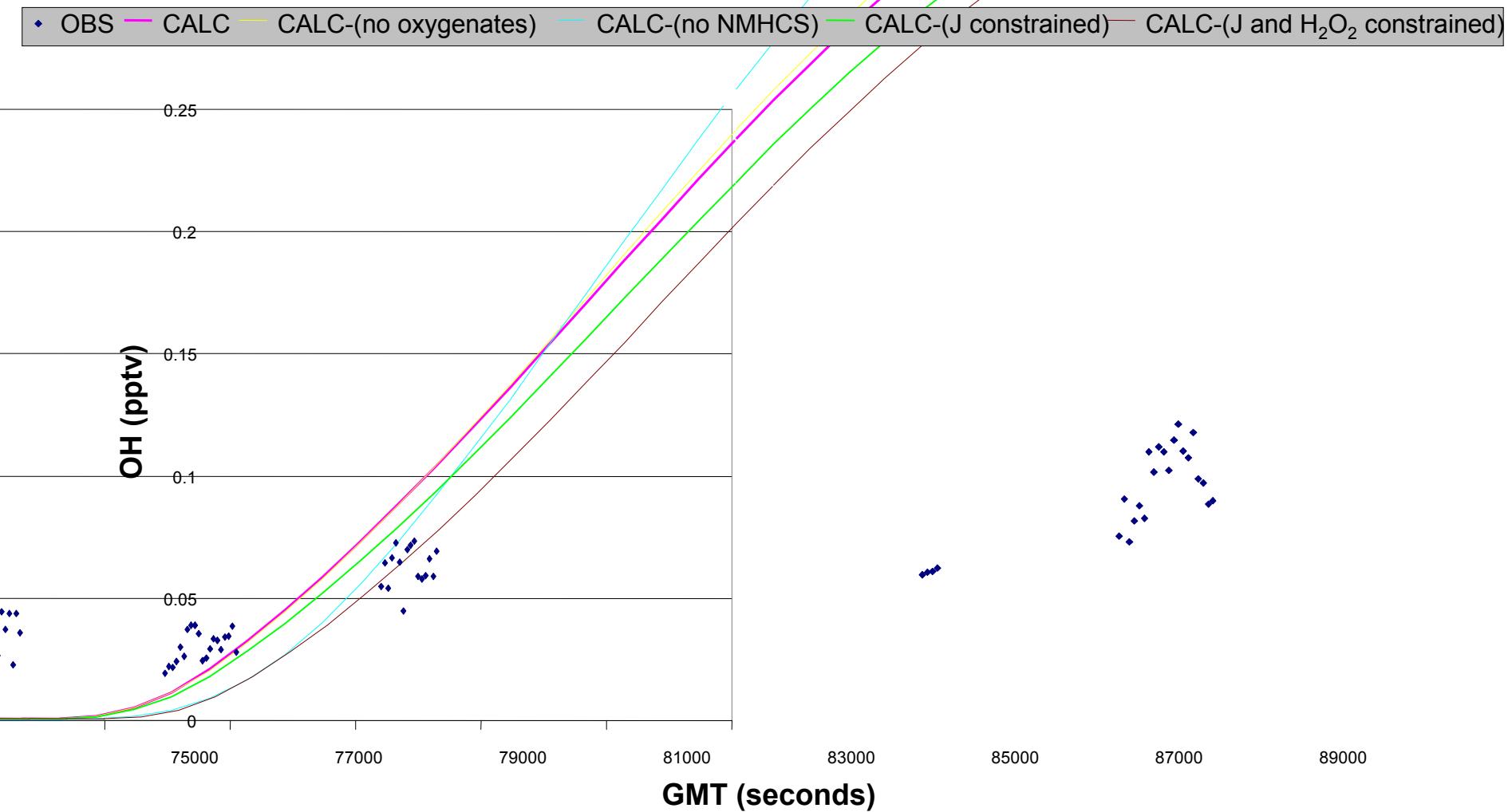
HO_2 vs. $J(\text{O}^1\text{D})^{1/2}$



HOx Production from O₃ and HCHO Photolysis

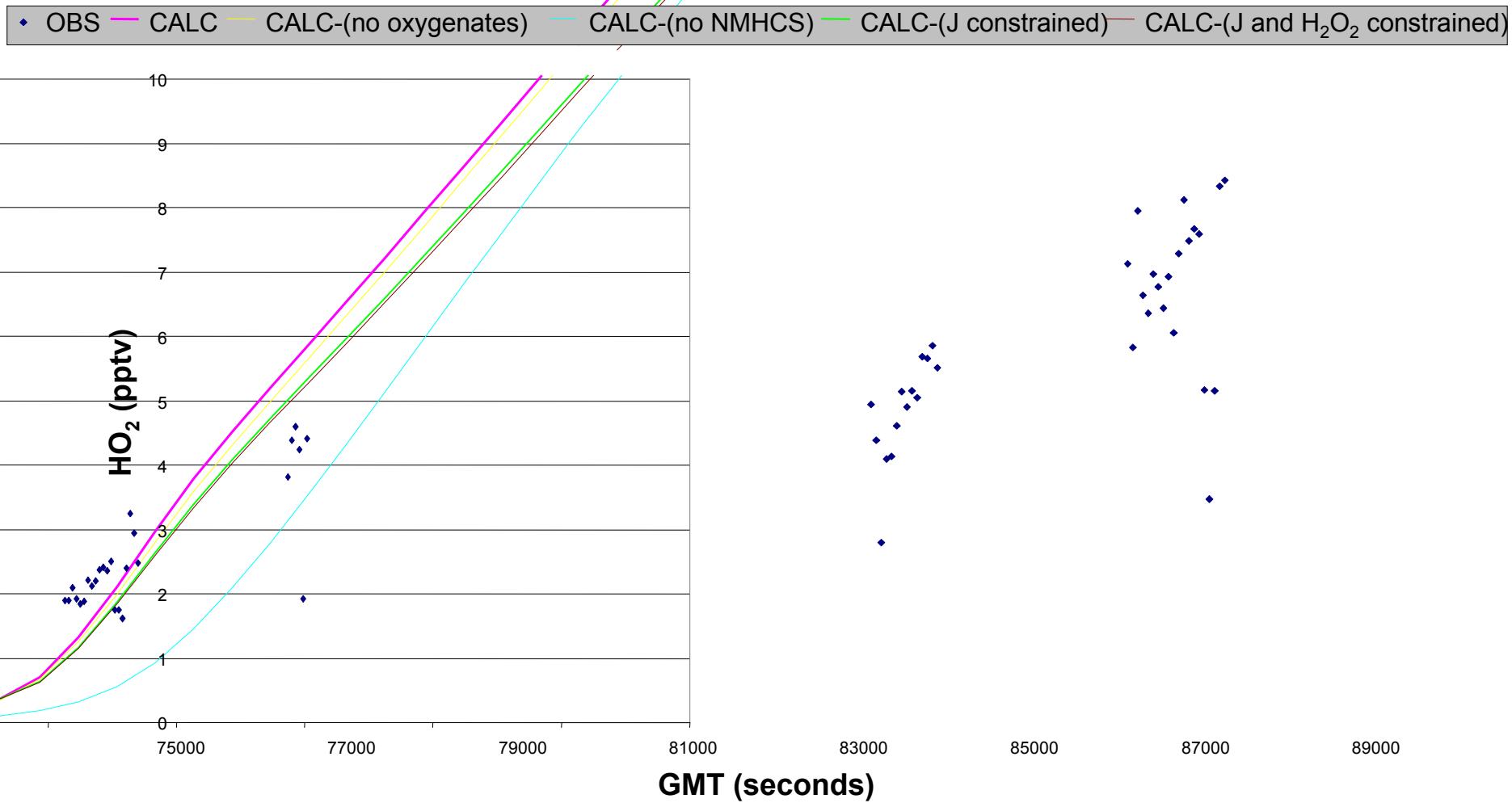


OH at 0.3 km (TRACE-P, DC-8, Flight 16)

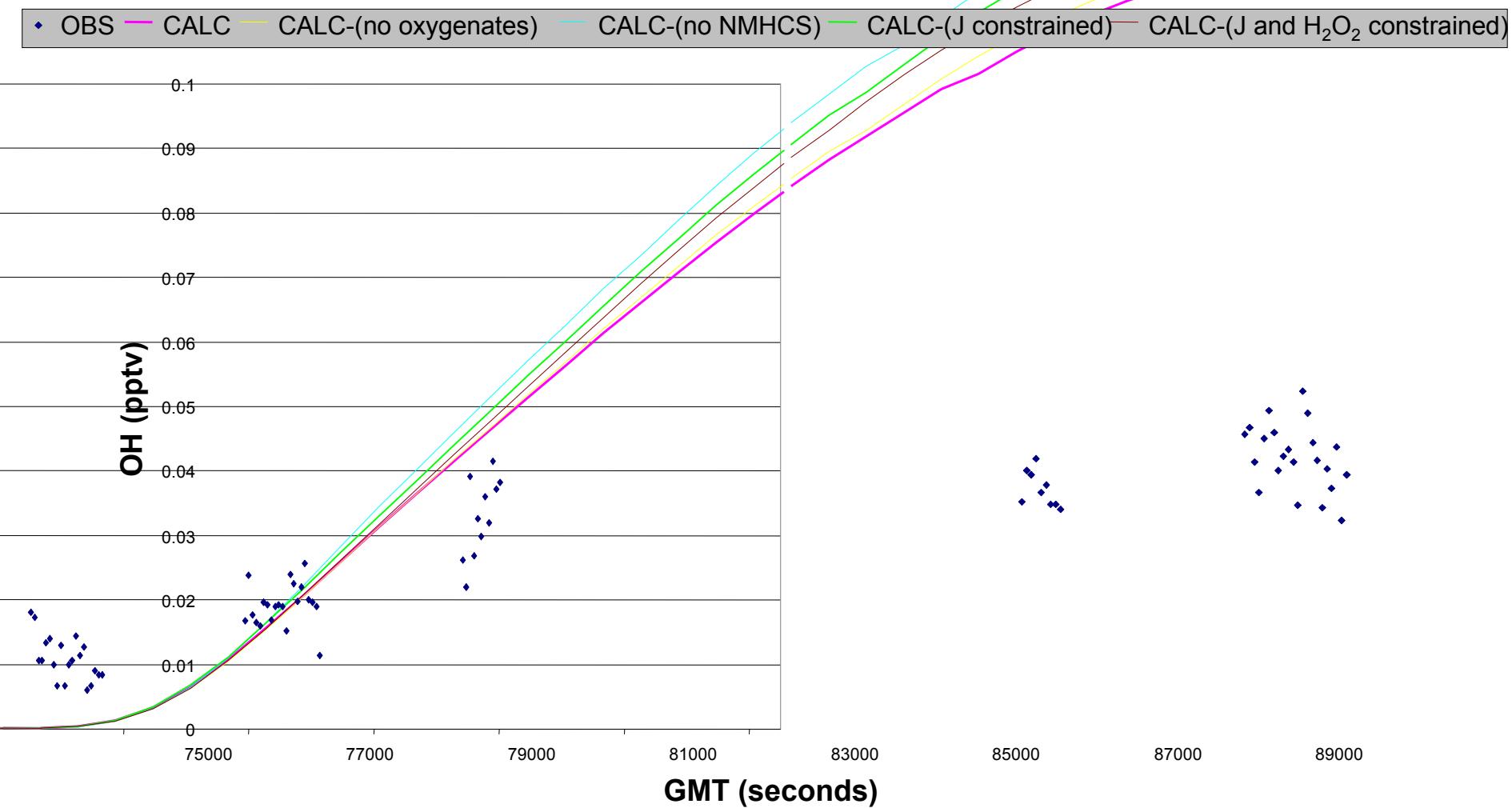


J. Crawford et al., 2001

HO₂ at 0.3 km (TRACE_P, DC-8, Flight 16)

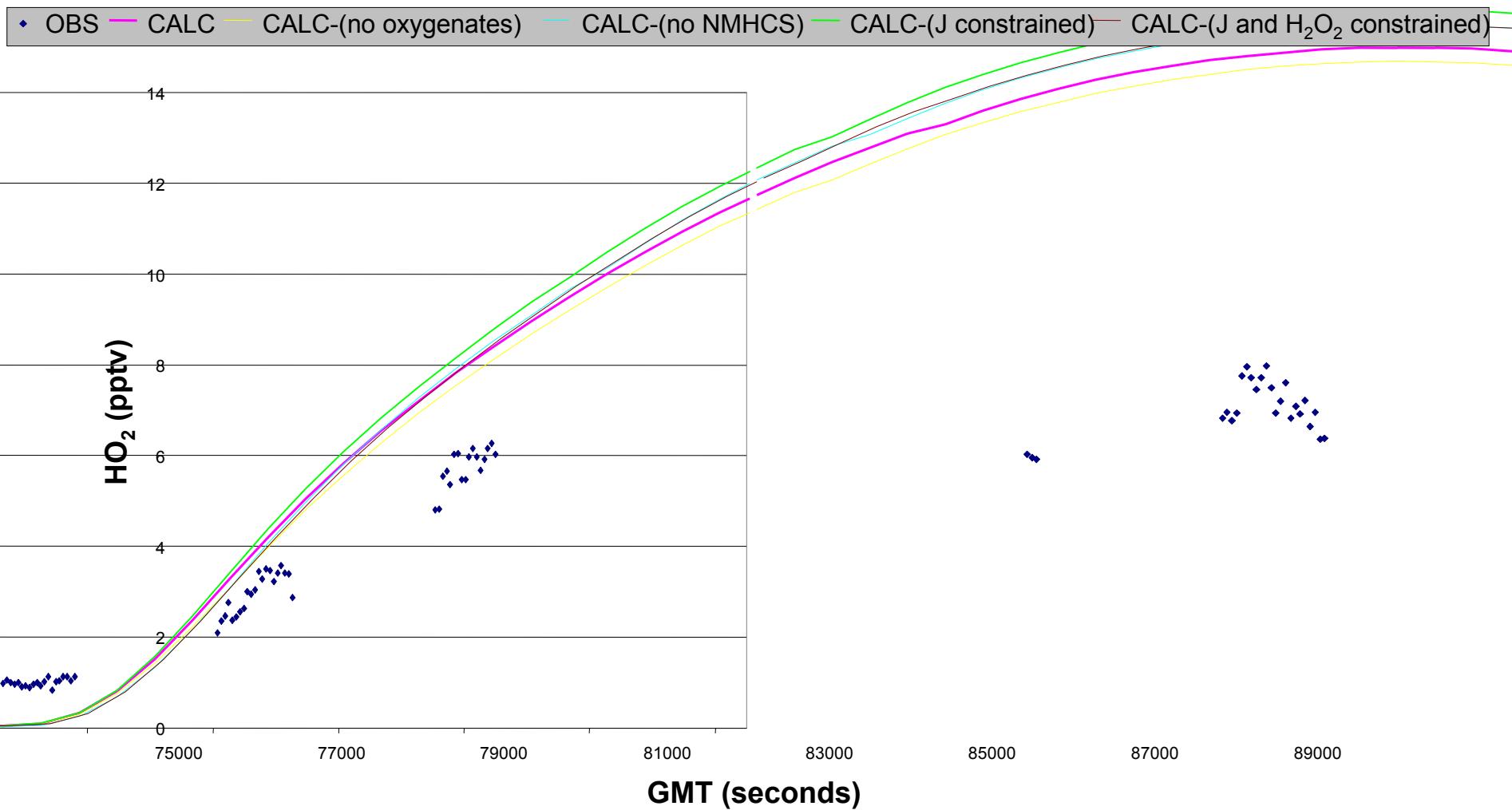


OH-high
OH at 2.7 km (TRACE-P, DC-8, Flight 16)



Model HO₂

HO₂ at 2.7 km (TRACE_P, DC-8, Flight 16)



J. Crawford et al., 2001

Conclusion & Outlook

- O₃ Budget :
 - Encountered pollution plumes in UT showed net O₃ production, at other altitudes more diverse O₃ budget
 - Characterize & Lagrangian model calculation
- General HOx behavior independent of altitude :
 - [HO₂] \propto (PHOx)^{1/2}
 - [OH] \propto PHOx (?)
 - Night time [OH] & [HO₂] \propto HCHO
 - Quantify sources & sinks
- Instrument tests
 - Indicate that night time observation is not due to internal photolytic OH production.
 - Concentrations of possible photolytic interfering species like HCHO, acetone, H₂O₂ under atmospheric conditions are far too low to explain observed night time concentrations
 - Try to find other non-photolytic OH and HO₂ interferences
- Sunrise/Sunset
 - [HO₂] \propto J(O₃ → O¹D)^{1/2}
 - First model calculations overpredict the increase of HOx at both altitude levels
 - Further investigate model and measurement during sunrise and sunset